

Two new species of trypanosomes, *Trypanosoma channai* n. sp. from *Channa punctata* and *Trypanosoma qadrii* n. sp. from *Clarias batrachus*

C C NARASIMHAMURTI and B SARATCHANDRA

Department of Zoology, Andhra University, Waltair 530 003, India

MS received 5 September 1979 ; revised 4 February 1980

Abstract. Two trypanosomes, *Trypanosoma channai* n. sp. from *Channa punctata* (Bloch) and *Trypanosoma qadrii* n. sp. from *Clarias batrachus* Bleeker are described. *Trypanosoma channai* n. sp. is a pleomorphic form having slender, medium and stumpy forms and measures 38.4-62.0 μ m (including free flagellum). The body length/width ratio of the slender, medium and stumpy forms ranges 14.5-17.3, 7.5-12.0 and 3.5-5.6 respectively. Kinetoplast subterminal; vacuoles absent in the slender forms and present in the other two forms. *T. qadrii* n. sp. is monomorphic measuring 30.4-48.2 μ m in length including free flagellum and 1.6-3.2 μ m in width. Both the ends are pointed; granules absent; kinetoplast subterminal.

Keywords. *Trypanosoma channai*; *Trypanosoma qadrii*; *Clarias batrachus*; *Channa punctata*.

1. Introduction

Valentine (1841) reported for the first time a trypanosome from a marine fish, *Salmo fario* and Danilewsky (1885) reported a trypanosome from a fresh water fish, *Cyprinus carpio*, which was later named *T. danilewskyi* by Laveria and Mesnil (1904). Since then numerous trypanosomes were described from both fresh water and marine fishes from different parts of the world. Lingard (1904) for the first time observed "two" species of trypanosomes from the blood of *Ophiocephalus striatus* from India, one from the fish caught in Poona (S.W. India) and the other from fish caught in North India. Subsequently several trypanosomes were reported from Indian fish. Raychaudhuri and Misra (1973) gave a brief review of the trypanosomes from ophiocephalid and related hosts.

In the present paper two new species of trypanosomes, *T. channai* n. sp. from *Channa punctata* (Bloch) and *T. qadrii* n. sp. from *Clarias batrachus* Bleeker are described.

2. Material and methods

The host fish were collected from fresh water ponds in and around Visakhapatnam and Srikakulam or purchased from the market and examined for trypanosomes.

A drop of blood obtained from the branchial artery was examined under the low power of a microscope to detect infection and when present was evident by the actively moving flagellates. EDTA or heparin is used to prevent the clotting of blood during smear preparation. These smears were air-dried, fixed in acetone free methyl alcohol and stained with Giemsa. All figures were drawn with the aid of a camera lucida and measurements were given in microns.

T. channai n. sp.

Observations : Ten out of 41 specimens of *Channa punctata* were infected with a pleomorphic trypanosome. Three morphologically different types, slender, medium and stumpy forms in the proportion of 10 : 70 : 20 differing in size, shape and length-width proportion were observed and a mensural comparison of these forms was given in table 1.

The slender forms were of uniform width throughout most of the length except at the ends where they taper to a fine point (figures 1 and 2). The cytoplasm was hyaline and stained pale bluish pink with Giemsa and did not contain any vacuoles or inclusions. The nucleus was elongate and contained irregular masses of deeply stained chromatin material. The kinetoplast was round or oval, sub-terminal and stained deep pink. A deeply stained flagellum originated from the kinetoplast made 7-10 convolutions over the body surface bordering the undulating membrane and emerged as a free flagellum anteriorly.

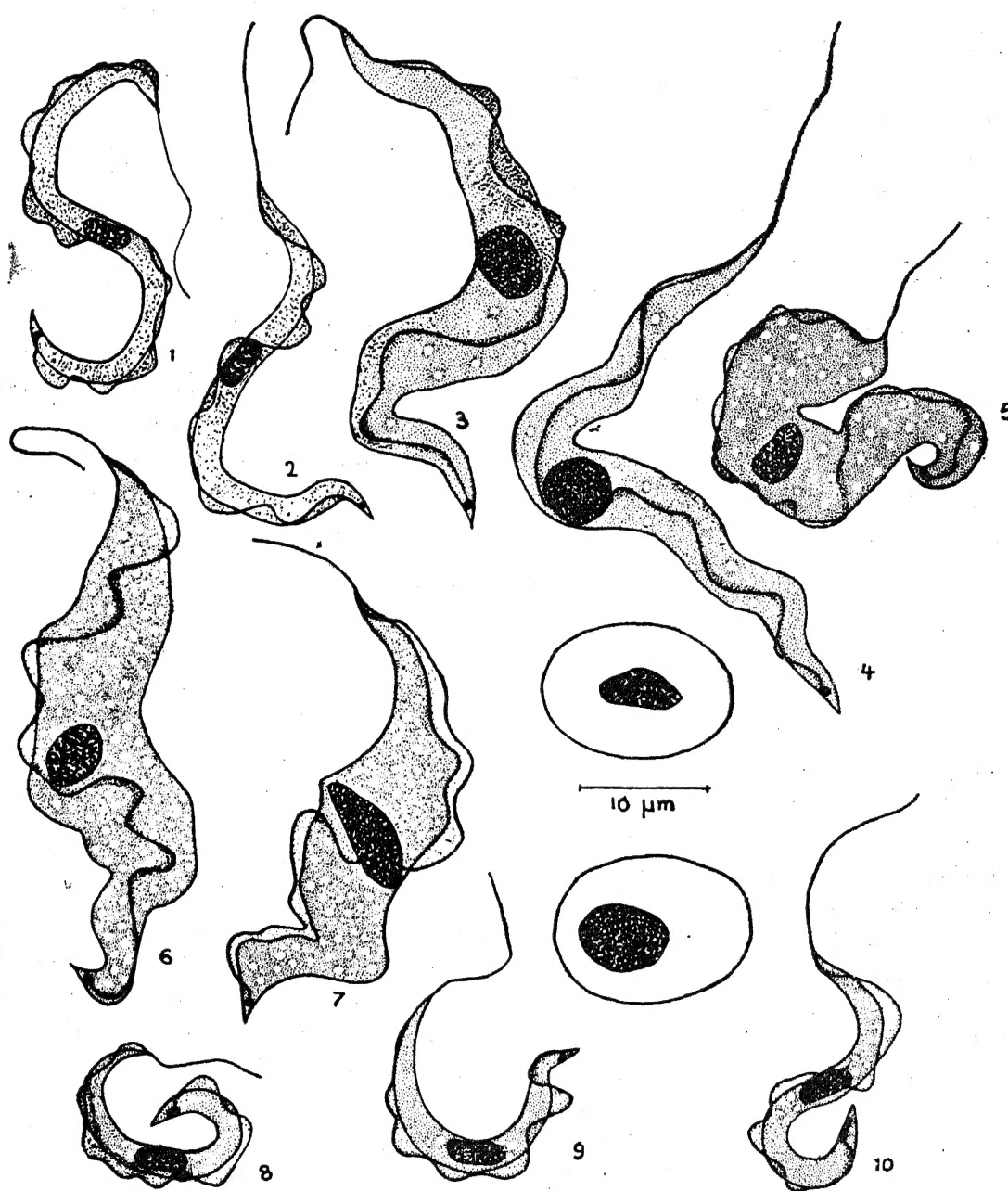
The medium-sized forms were also pointed at both the ends but the body was broadest at the place where the nucleus was situated which was approximately in the centre of the body (figures 3 and 4). The cytoplasm stained pink and contained a few vacuoles distributed at random. The nucleus was round or oval.

The short and stumpy forms were much broader than the medium-sized forms but resemble them in their structure and staining properties except that they had numerous vacuoles distributed throughout the cytoplasm (figures 5, 6 and 7).

Systematic position. *T. striati* Qadri, 1955 is the only trimorphic form among the ophiocephalid hosts. It has granules in the cytoplasm which are absent in the

Table 1. Measurements of the three forms of *Trypanosoma channai* n. sp. (in microns).

	Slender	Medium	Stumpy
Length of the flagellate (including free flagellum)	38.4-51.2	44.8-62	42-53
Length of the cell body	23.2-41.6	36.8-49	30.5-44.5
Width of the cell body	1.5-2.5	4-5	7.2-9.6
Length of free flagellum	8.15.2	6.4-16	8-13.6
Length of the nucleus	2.4-3.2	2.4-4.8	4.8-7.6
Width of the nucleus	1.6	2.5-4	3.2-4
Diameter of kinetoplast	0.7	0.7	0.7



Figures 1-10. 1-7. *Trypanosoma channai* n. sp. 1-2. Slender forms. 3-4. Medium forms. 5-7. Stumpy forms. 8-10. Monomorphic forms of *T. qadrii* n. sp.

present form. In *T. striati* greater number of vacuoles were present in the slender form than in the medium and stumpy forms while in the present case they were absent in the slender form and present in the medium and stumpy forms, the latter containing more of them. Further, the length of the free flagellum in the three different forms and the number of folds in the undulating membrane vary from those of the present form. The trimorphic form described by Dutton *et al* (1907) has 4 lobed granular kinetoplast unlike in the present form. *T. occidentalis* Becker

(1967) which is also trimorphic has myonemes in the stumpy forms which are absent in the present form.

The two species of trypanosomes reported by Lingard (1904) were considered to be dimorphic forms of the same species (Qadri 1955). Lingard (1904) unfortunately had neither given any figures or dimensions to make a comparison with the present form. The unknown species described by Wenyon (1908) from *Ophiocephalus obscurus* collected from the river Nile; *O. maculatus* and *O. striatus* from Indochina by Mathis and Leger (1911); *T. ophiocephali* Pearse, 1933 from *O. striatus*; *T. punctati* Hasan and Qasim, 1962 from *O. punctatus*; *T. elongatum* Raychaudhuri and Misra, 1973; *T. danilewskyi* Laveran and Mesnil, 1904; *T. saccobranchi* Castellani and Willey, 1905-1906; *T. danilewskyi* var. *saccobranchi* Qadri, 1962; *T. baigulensis* Pandey and Pandey, 1974; *T. punctali* Mandal, 1975 and *T. chowdhuryi* Mandal, 1977 are monomorphic and *T. gachuii* Misra *et al* 1973; *T. armeti* Mandal, 1975; *T. mukundi* Raychaudhuri and Misra, 1973 and *T. batrachi* Qadri, 1962 are dimorphic. For these reasons the present form is considered new and the name *T. channai* n. sp. is proposed for the same.

T. qadrii n. sp.

Observations: Five out of 25 specimens of *Clarias batrachus* Bleeker were infected with a monomorphic trypanosome. The body of the trypanosome was elongated and both the ends were pointed (figures 8, 9 and 10). The cytoplasm was hyaline and stained bluish pink with Giemsa. It contained a few small vacuoles on either side of the nucleus. No granules were seen in the cytoplasm. The nucleus which stained dark pink was elongated with its long axis lying parallel to that of the body and was situated more towards the kinetoplast end. The chromatin was in the form of interconnected clumps. The kinetoplast which was oval or slightly elongated was subterminal in position. A deeply stained flagellum which was connected to the body wall by an undulating membrane originated from the kinetoplast, made 6-8 convolutions over the body and emerged at the anterior end as a free flagellum. The measurements in microns of the parasites are as follows :

Length of the flagellate	
(including free flagellum)	30.4-48.2
Length of the cell body	20.8-32.0
Breadth of the cell body	1.6- 2.2
Length of the free flagellum	5.5-14.5
Length of the nucleus	2.5- 4.0
Width of the nucleus	0.8- 1.6
Length of the kinetoplast	1.0- 1.6
Width of the kinetoplast	0.5- 0.8

Systematic position. Several trypanosomes were reported from the fishes belonging to the family Clariidae. Montel (1905) reported *T. clariae* from *C. macrocephalus* from Cochinchina but no description was given. Dutton *et al* (1907) described

a trimorphic trypanosome from *C. angolensis*. Bouet (1909) reported a trypanosome from the same host and believed that it was same as that described by Dutton *et al* (1907). Wenyon (1908) reported a trypanosome from *C. anguillaris* but did not give the description or a specific name. Dias (1952) described *T. andrade-silvae* resembling the trypanosome described by Bouet (1909) which in turn resembled the trimorphic form described by Dutton *et al* (1909) but the flagellum was much shorter. Baker (1960) supposed that *T. andrade-silvae* was the same as that described by Fantham (1919) and later thought they were same as *T. barbi* Brumpt. Dias (1952) described *T. tobei* from *C. angolensis* which was identical with the trimorphic trypanosome described by Dutton *et al* (1907) from the same host and was considered invalid by Baker (1960). Qadri (1962) reported *T. batrachi* from *C. batrachus* which closely resembles the present form, but *T. batrachi* was a dimorphic form having a large terminal kinetoplast and contained metachromatic granules, while the present form has a small subterminal kinetoplast and metachromatic granules were absent. *T. maguri* Tandon and Joshi, 1973 from the same host, *T. winchesiense*, *T. baigulensis*, *T. puncali* and *T. choudhuryi* contained granules in the cytoplasm unlike in the present form. *T. danilewskyi*, *T. danilewskyi* var. *saccobranchi*, *T. mukundi*, *T. elongatum*, *T. gachuii*, *T. choudhuryi*, *T. punctati*, *T. ophiocephali* and those described by Mathis and Leger (1911) and Lingard (1904) vary from the present form in structure and dimensions. *T. striati*, *T. occidentalis* and *T. channai* are trimorphic and *T. mukundi*, *T. armeti* and *T. gachua* are dimorphic. In view of all the differences mentioned, the present form from *Clarias batrachus* is considered new and the name, *Trypanosoma qadrii* n. sp. in honour of Professor S S Qadri is proposed for the same.

Acknowledgements

One of us (BS) is grateful to the CSIR, New Delhi, for the award of a Fellowship.

References

- Baker J R 1960 Trypanosomes and dactylosomes from the blood of fresh water fish in East Africa; *Parasitology* **50** 515-526
- Becker C D 1967 *Trypanosoma occidentalis* sp. n. from fresh water teleosts in Washington State; *J. Protozool.* **14** 153-156
- Bouet G 1909 Sur quelques trypanosomes des vertebres a ang froid de l'Afrique occidentale francaise; *C.R. Soc. Biol. Paris* **66** 609
- Castellani A and Willey A 1905-1906 Observations on the haematozoa of vertebrates in Ceylon; *Q. J. Microsc. Sci.* **49** 39
- Danilewsky B 1885 Zur parasitologie des blutes; *Biol. Zbl.* **5** 529
- Dias J A T S 1952 Uma nova espécie de tripanosoma, parasita do *Clarias gariepinus* (Burchell, 1882) piexe Africano de água doce; *An. Inst. Med. Trop. Lisbon* **9** 167-179
- Dutton J E, Todd J L and Tobey E N 1907 Concerning certain parasitic protozoa observed in Africa. Part II; *Ann. Trop. Med. Parasitol.* **1** 287
- Fantham H B 1919 Some parasitic protozoa found in South Africa. II; *South African J. Sci.* **16** 185-191
- Hasan R and Qasim S Z 1962 *Trypanosoma punctati* n. sp. from the fish *Ophiocephalus punctatus* Bloch, common fresh water murrel of India; *Z. Parasitenka.* **22** 118-122

- Laveran A and Mesnil F 1904 Trypanosomes et Trypanosomiasis ; Paris XI. pp. 418.
- Lingard A 1904 A short account of the various trypanosomata found to date in blood of some of the lower animals and fish ; *Indian Med. Gaz.* 39 445
- Mandal A K 1975 Two new trypanosomes from Indian fresh water fishes ; *Angew. Parasitol.* 16 87-91
- Mandal A K 1977 *Trypanosoma choudhuryi* sp. nov. from *Tilapia mossambica* (Peters); *Acta Protozool.* 16 1-4
- Mathis C and Leger M 1911 Trypanosomes de poissons d'eau douce du Tonkin ; *C.R. Soc. Biol. Paris* 71 185-187
- Misra K K, Chandra A K and Chaudhuri A 1973 *Trypanosoma gachuii* n. sp. from a fresh water teleost fish, *Ophiocephalus gachua* Ham. *Arch. Protistenk.* 115 1821
- Pandey K C and Pandey A K 1974 Studies on a new species of *Trypanosoma* Gruby from fishes and its effect on piscine hosts ; *Indian J. Zootomy* 15 15-18
- Qadri S S 1955 The morphology of *Trypanosoma striati* n. sp. from an Indian fresh water fish ; *Parasitology* 45 79-85
- Qadri S S 1962 On three new trypanosomes from fresh water fishes ; *Parasitology* 52 221-228.
- Raychaudhuri S and Misra K K 1973 Two new trypanosomes from India ; *Arch. Protistenk* 115 10-17
- Tandon R S and Joshi B D 1973 Studies on the physiology of fresh water fish infected with two new forms of trypanosomes ; *Z. Wiss. Zool.* 185 207-221
- Valentin G G 1841 Uber ein entozoon im blute von *Salmo fario* ; *Arch. Anat. Phys. Wiss. Med.* p. 435
- Wenyon C M 1908 Report of travelling pathologist and protozoologist ; 3rd Rep. *Welcome Res. Lab.* pp. 121-168